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Analysis of competitiveness of lowland rice farming in Indonesia: Case study of Bolaang Mongondow District, North Sulawesi Province

Zulkifli Mantau^{1*}, Harianto² and Nunung Nuriantono²

¹Gorontalo Assessment Institute for Agricultural Technology (AIAT Gorontalo), Jl. Kopi No.270 Kec. Tilongkabila Kab. Bone Bolango Gorontalo 96183, Indonesia.

²Department of Agriculture Economics, Bogor Agriculture University, Indonesia

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Further development through the application of technological innovations may result to rice export in North Sulawesi. It is necessary to do a study on the competitiveness level of this commodity, especially if there is a local policy to export rice. The aims of this research are: (1) to analyze the profitability of rice farming in Bolaang Mongondow District; (2) to analyze the comparative and competitive advantages of rice farming in Bolaang Mongondow District; (3) to analyze the impact of government policy on competitiveness of rice farming in Bolaang Mongondow District. Primary data were collected from 100 rice farmers. Data obtained was analyzed using policy analysis matrix (PAM). The results revealed that private and social profitability of rice farming are IDR 3,870,106 and IDR 3,493,646, respectively. Private cost ratio of rice farming was 0.69. Domestic resources cost ratio of rice farming was 0.68. The output transfer and nominal protection coefficient output indicated that the total value of input was 7% higher than the social price. The transfer input, nominal protection coefficient on input and transfer factor indicated that there is a protective policy to input tradable and non tradable producers. The results of effective protection coefficient, net transfer, profitability coefficient and subsidy ratio to producers of rice were 1.16, IDR 376,460.51, 1.11 and 0.03. Conclusively, rice commodities in Bolaang Mongondow have comparative and competitive advantages. In addition, the government policies of rice were protecting and beneficial to farmers in Bolaang Mongondow District of North Sulawesi Province.

Key words: Comparative and competitive advantages, rice farming, policy analysis matrix (PAM).

INTRODUCTION

Indonesia is a country with a large population in the world. Indonesia's population in 2011 is estimated to be 241 million people. The level of rice consumption was up

to 139 kg per capita higher than Malaysia and Thailand which was only 65 to 70 kg per capita per year (Indonesia Finance Auditor Agency, 2012). This condition made rice

*Corresponding author. E-mail: mantau66@yahoo.com. Tel: +628124482704, +62435827627.

to be the main agricultural commodity in Indonesia. The government has always issued a policy of national rice management.

The rice policy in Indonesia was radically changed after the reformation movements (Yao, 1997). In the monetary crisis period (1997 to 1999), the government liberalizes the trade of rice. The policy cut most of the National Logistic Agency (BULOG) roles, especially for monopoly import of rice. Beginning in year 2000, market and trade liberalization was corrected. Although the government presently excludes the private sector from importing rice, it still controls tariff and non tariff policy. Since 2004, importation of rice was restricted. First, rice importation was banned at the harvest seasons but was later permitted for import after the harvest season. Secondly, rice import quota was only given to the importer. The policy of rice was corrected again and then importation of rice was banned over the year. The reason being the government believes that national production of rice is still sufficient for domestic demands. Since 2007, rice importation has been monopolized by BULOG (Sawit and Halid, 2010).

In 2008, price crisis of rice occurred in abroad, rice marketers became worried. The instability of global rice price was not explained by supply and demand theory, but was predominantly determined by fear and political decisions of each importer and exporter countries (Sawit and Halid, 2010). Indonesia implemented policies to increase rice production for the anticipation of rice price crisis. The national budget (APBN) was allocated to subsidize the use of fertilizers, seeds and credits for rice farming. The impacts made the production of paddy-rice increase to (5.4% per year) in the period 2007 to 2009; 2.9% harvested area growth and 2.5% productivity growth. The price of rice become attractive for the farmer than the price of other commodity such as soybean, maize and cane (Sawit and Halid, 2010). Also, rice was more competitive than other commodities.

The change for free market regime from controlled-market to free-market resulted to rice price in domestic market which was increasingly exposed to the market fluctuation, that is influenced directly to the competitiveness of domestic rice farming system. The fluctuation of rice price can be caused by domestic production, international price and exchange rate fluctuation. Transmission rates tend to be symmetrical from exchange rate volatility and agriculture product price on world markets; in the dynamics of domestic price of agriculture products. It indicates the strong correlation of the three dimensions of market (Rachman et al., 2004).

Although North Sulawesi Province is not included in the Indonesia's top ten rice producer, but it has one district that become a granary for North Sulawesi and Gorontalo, namely Bolaang Mongondow district. Based on the research of North Sulawesi AIAT in 1999, the rice commodity in Bolaang Mongondow has a comparative advantage with The Domestic Resources Cost Ratio

(DRCR) of 0.61 (Zulkifli and dan Aryanto, 2000). Meanwhile, for the last 10 years much was not found about the new information on the comparative and competitive advantage of rice farming in this region. It could be increased or even decreased, because comparative advantage is a dynamic value and sometimes these advantages can be taken over by other commodities. In fact, the information and data of competitiveness are very important for local government as a reference to decide the policy or intervention. Mainly, if rice is expected to be an export commodity in North Sulawesi Province.

The study aims to: (1) Analyze the profitability aspects of rice farming in Bolaang Mongondow District, (2) Analyze the comparative and competitive advantage of rice farming in Bolaang Mongondow District and (3) Analyze the impact of government policies on competitiveness of rice farming in Bolaang Mongondow District.

METHODOLOGY

Study area and data sources

The study was conducted in five sub districts at Bolaang Mongondow District of North Sulawesi Province. It was decided by a purposive method. The places of study were Nonapan I village at Poigar Sub-district, Bolaang village at East Bolaang Sub-district, Langagon village at Bolaang Sub-district, Lolayan village at Lolayan Sub-district and Lolak II village at Lolak Sub-district. Primary data were obtained from interviews with the farmers, traders at villages and Sub-districts level, while the secondary data were obtained from BPS office of North Sulawesi and Bolaang Mongondow, office of Agriculture and Livestock in Bolaang Mongondow, office of Trades and Industry, Customs office, PELINDO and data searching via internet.

Research procedure and sampling method

The formal survey was undertaken by interviewing 100 purposively selected farm household using a structured questionnaire. Random sampling method was employed for the selection of rural farmer for this study. The purposive method was employed for the selection of secondary informants such as agriculture extension agents, village officials and community leaders. Each village consist of 20 respondents \times 5 sub districts = 100 respondents of farm household.

Analysis method

Tsakok (1990) argued that there are two methods use in measuring the comparative advantage, namely: *Domestic Resources Cost Ratio (RBSD)* and *Net Economic Benefit Ratio (NEBR)*. The other method or tools use were *Revealed Comparative Advantage (RCA)*. Pearson et al. (2005) argued that Policy Analysis Matrix (PAM) was more comprehensive than the other methods use in measuring the competitiveness. The construction of PAM for an agricultural system allows one to calculate private profitability – a measure of the competitiveness of the system at actual market prices. Similar analysis of other systems permits ranking of the competitiveness of agricultural systems at market prices. The calculation of private profitability or competitiveness is carried out in the first (top) row of the PAM matrix. This result serves as the baseline for benefit-cost

Table 1. Policy analysis matrix.

	Revenues	Costs		Profits
		Tradable inputs	Domestic factors	
Private price	A	B	C	$D = A - B - C$
Social price	E	F	G	$H = E - F - G$
Effects of divergences and efficient policy	(OT) $I = A - E$ NPCO = A/E	(IT) $J = B - F$ NPCI = B/F	(FT) $K = C - G$	(NT) $L = D - H = I - J - K$; PC = D/H

Source: Monke and Pearson (1989).

Notes: D = Private profitability; H = social profitability; I (OT) = output transfer; NPCO = Nominal Protection Coefficient on Output; (IT) J = transfer input; NPCI = Nominal Protection Coefficient on Input; (FT) K = factor transfer; (NT) L = Net Transfer; PC = Profitability Coefficient.

analysis in the actual market (private) prices.

The second purpose of the PAM approach is to estimate the agricultural system's social profitability – the result products produced and inputs used are valued in efficiency prices (social opportunity costs). Complementary analyses of other systems permit ranking of the efficiency of agricultural systems. The calculation of social profitability is carried out in the second (middle) row of the PAM matrix. This outcome provides baseline information for social benefit-cost analysis, using efficiency prices.

The third purpose of PAM analysis is to measure the transfer effects of policies. By contrasting revenues and costs before and after the imposition of a policy, one can determine the impact of that policy. The PAM method captures the effects of policies influencing both products and factors of production (land, labor and capital). The measurement of the transfer effects of policies is carried out in the third (bottom) row of the PAM matrix, as demonstrated in Table 1 (Pearson et al., 2005). According to the explanation, this research used *policy* PAM as an analysis method (Table 1). Several indicators analysis of PAM are:

Profitability analysis

Private Profitability (PP): $D = A - (B+C)$ (all the value of A, B, C, D, E, F, G sign according to the PAM Table) Private profitability is an indicator for competitiveness based on private price (actual price) of output. If $D > 0$, the system profit gain for commodity normal costs that have implications, is that commodity is capable of expansion, unless the limited resources or commodities is a more profitable alternative.

Social Profitability (SP): $H = E - (F+G)$ Social profitability is an indicator of comparative advantage of the commodity on the condition of no divergence in the system either due to government policies and market distortions. If $H > 0$, this means the system of commodity gain profit at the expense of normal social cost and can be given priority in development.

Financial and economy efficiency (Competitive and Comparative advantages)

Private Cost Ratio (PCR) = $C/(A-B)$: the private profitability indicator shows the system's ability to pay the cost of commodities from local resources and remain competitive. If the PCR < 1 , it means that the system studied commodities have a competitive advantage and also vice versa.

Domestic Resource Cost Ratio (DRCR) = $G/(E-F)$ is a

comparative advantage indicator. The system has a comparative advantage if $DRC < 1$ and also vice versa.

The impact of government policy

Output Policy

Output Transfer: OT = A-E: Transfer output is the difference between the revenue which was calculated on private price (financial price) with revenues which was calculated on the social price or shadow prices. If the value of OT > 0 indicates a transfer from the consumers to producers and also vice versa.

Nominal Protection Coefficient on Output (NPCO) = A/E : NPCO is an indicator that shows the level of government protection of domestic agricultural output. Protective policy on output if the value NPCO > 1 and vice versa if the policy is a disincentive NPCO < 1 .

Input Policy

Transfer Input: IT = B - F. If the value of IT > 0 , indicates the transfer from farmers to the producers of tradable inputs and also vice versa.

Nominal Protection Coefficient on Input (NPCI) = B/F : Policies are protective of the input if the value of NPCI < 1 . It means that there is a subsidy policy on tradable inputs and vice versa.

Factor Transfer: FT = C - G: The value of FT > 0 , implying that there is a transfer from farmer to the producer of non tradable inputs and vice versa.

Input-output policy

Effective Protection Coefficient (EPC) = $(A-B)/(E-F)$: Policy is still protective if the value of EPC > 1 . The greater EPC value means that there is a higher level of government protection on domestic agricultural commodities.

Net Transfer: NT = D - H: Value of NT > 0 , showing that the additional producer surplus caused by government policies that is applied to the input and output and vice versa.

Profitability Coefficient: PC = D/H . If the PC > 0 , means that the overall government policy provides incentives to producers and vice

Table 2. Policy analysis matrix result of rice farming in Bolaang Mongondow District (IDR)

	Revenues	Tradable inputs	Domestic Factors Non Tradable		Profits
			Labor	Land and Capital	
a.Private	13 705 580.09	1 268 151.97	5 434 977	3 132 345	3 870 106
b.Social	12 810 066.64	2 055 111.34	4 706 137	2 555 173	3 493 646
c.Divergence	895 513.44	-786 959.38	728 840	577 172	376 461

versa.

Subsidy Ratio to Producer (SRP) = L/E = (D-H)/E: is an indicator that shows the proportion of revenues to the necessary social price, if subsidies or tax used as a substitute for policy.

RESULTS AND DISCUSSION

Private and social profitability

Based on financial and economic analysis results, the net financial income earned (excluding the land component) of IDR 5,587,634 / year with RC-ratio of 1.69. If the land component includes, the net income earned was IDR 3,870,106 / year and the RC-ratio was 1.39, while the economic net income of IDR 5,164,095 / year and the RC-ratio was 1.68 (outside the land component). Meanwhile, if it includes land component, net profit was IDR 3,446,567 / year and the RC-ratio was 1.37. This implies that rice farming is financially better off than economically. It means that the rice farming was profitable for the farmer individually. In other words, the production costs incurred by each farmer for two seasons can be covered by the sale price of rice.

Table 2 shows that the private profitability of rice farming has a higher value than its social profitability. This is an early indication that there is competitive advantage of rice farming. The dominant crop cultivated in Bolaang Mongondow is paddy-rice, because of areas known as the rice granary of North Sulawesi Province. Rusastra et al. (2004) found out in their research about competitiveness of soybean that financially, soybean farming does not have competitive advantage and inefficient in resource utilization. This commodity will experience difficulty in its development when there is other commodity which would turn out to have a higher competitiveness financially. Similarly, the rice farming in Bolmong will experience the same thing (difficulty in its development) if it decreased level of benefit financially.

Social profitability indicates a comparative advantage of commodity in the utilization of scarce resources in the country. Commodity systems with higher level of social profitability (economic) showed that the level of comparative advantage is growing. The PAM analysis in Table 2 shows the social profitability is quiet high. It is indicated in the beginning that rice farming in Bolaang Mongondow also has a comparative advantage.

According to the table, the divergence occurs only in tradable input components. Pearson et al. (2005) suggested that the first cause of divergence is market failure. There are three types of market failure that causes divergence, that is: (1) monopoly (which controls the seller about the market price) or monopsony (buyer's market control), (2) the cost is negative externality where there is no cost charge for the person or company that incurred the cost. The benefits is positive externalities where there's no compensation for the person or company that may result to benefits, (3) domestic factor markets are not perfect, where there is no institution that can provide competitive services and comprehensive information. The second cause of divergence is distortive government policy, which is applied to achieve non-efficiency (or distribution of food security) that will inhibit the efficient allocation of resources and may result to divergence.

Competitive and comparative advantages

The value of PCR and DRPCR of rice farming based on PAM analysis are 0.69 and 0.68, respectively. These results indicate that the rice farming in Bolaang Mongondow has comparative and competitive advantage. So it is likely to be developed as an export commodity. PCR value 0.69 means that to obtain value-added output by one unit at the private price of rice farming in the region, requires additional domestic factor costs of 0.69 or less than one unit. So it can be argued that production costs may be covered with the actual sale price obtained by farmers.

DRC value 0.68 means that to produce paddy (rice) in the region, Bolaang Mongondow only need the domestic resource costs as a 68% to save US\$ 1 foreign exchange, if produced in the region than import it. So there are opportunities to exports goods to other regions or countries and rice agroindustry.

The rice industry is related to the development of upstream and downstream industries. The upstream industry consists of seed, fertilizer, agriculture tools and pesticides industries. The downstream industry consists of rice milling, hotel/food stall/restaurant, flour, food industries and the feed industry as well (Sawit and Lokollo, 2007). Rachman et al. (2004) found out that PCR value in Sidrap (South Sulawesi) was 0.55 to 0.58 at irrigation area. DRPCR value was 0.68 to 0.57 at irrigation

Table 3. An average price of subsidized fertilizer in five sub-district at Bolaang Mongondow District

Fertilizer Type	Fertilizer Price in Research Sites (IDR/kg)				
	Poigar	Bolaang	Bolaang Timur	Lolayan	Lolak
Urea	1,463	1,373	1,571	1,433	1,592
Phonska	2,641	2,306	2,890	2,181	2,583

area. These results seem the same with PCR and DRCR value in Bolaang Mongondow District. It is possibly because there is the same agro climate factor between North Sulawesi (Bolmong) and South Sulawesi (Sidrap). Rachman et al. (2004) argued that several technical factors which influence the comparative and competitive advantage were: (1) Climate. It influences the availability and farmer access to water resource; (2) Irrigation infrastructure. It influences the availability, access and control of water resource; (3) Accessibility of economy tools, (4) adoption of technology level. In addition, several economy factors which influence were input and output price, interest rate, exchange rate and wage level. These factors have a relationship with market mechanism of input, employment and capital in the rural area.

The impact analysis on government policy

Output policy

The result on output transfer (OT) and nominal protection coefficient of output (NPCO) were IDR 895,513.44 and 1.07, respectively. It is indicated that the total value of output was 7% higher than the social price. This is caused by the importation tariff policy on output (rice) by the government. In addition, it shows that there is a protective policy on the price of domestic rice (output). So that the farmers can accept the output price higher than international price.

Similar from that result, Anapu et al. (2005) found out that importation tariff policy of rice can protect the rice farming system in Minahasa District of North Sulawesi Province. The research found the average of output divergence was 39%, where 30% comes from import tariff policy. The private profitability will be negative without protection. In addition, Hadi and Wiryono (2005) concluded that the protection policy (a combination of tariff and non tariff) successfully increased producer prices, the amount of production, producer surplus and farmers' income and also reduce the amount of rice importation significantly. Non-tariff policy has a greater effect than tariff policy. But it does not mean that one policy can be eliminated because they both reinforce each other.

Input policy

The results on transfer input (TI), nominal protection

coefficient of input (NPCI) and transfer factor (TF) were IDR -786,959.38, 0.62 and IDR 1306012.31, respectively. It means that the value of input subsidy in rice farming was IDR 785,522.96, with ratio 62% from social price. The subsidy prepared by government for domestic factors (labor, capital and land) was IDR 1,306,012/two seasons. It showed that there is protective policy for input tradable and non tradable producers. The finding showed that the price of subsidized fertilizer in each Sub-district was more expensive than government price (HET) (Table 3). Whereas according to government regulations, the subsidized price of urea fertilizer is IDR 1,200/kg and phonska fertilizers is IDR 1,700/kg. Since the private cost is higher than the social cost, then there is no subsidy.

Darwis and Nurmanaf (2004), in their study suggested some strategic policies which consider government to solve the fertilizer problem at the farm level, namely: (1) rationalization of fertilizer use at farm level; (2) fertilizer recommendations based on site-specific soil analysis; (3) the increase in effectiveness of the use of inorganic fertilizers which complemented with the use of organic fertilizers; (4) improvement in the implementation of standardization and certification of fertilizers and (5) the implementation of export and import policies which is a support to the continuity on fertilizer and fertilizer prices at farm level.

Nuryanti (2005) in her research conclusion suggested that the policy in the input prices (urea) and output prices (grain) will not cause any market stability disturbance because supply and demand of rice is relatively stable; hence the input subsidies or protection policy on output price as found in the study is sufficiently safe and very helpful for the farmers, especially in the terms of output price stability.

Input-output policy

The value of effective protection coefficient (EPC), net transfer (NT), profitability coefficient (PC) and subsidy ratio to producers (SRP) on paddy farming were 1.16, IDR 376,460.51, 1.11 and 0.03, respectively. This shows that in general there is a protection on output and input rice farming, so the overall general government policy could benefit farmers and reduce the cost of production. On EPC, Suprpto (2006) found out that the maize (hybrid and composite) will be protected by government if it is used as an export commodity ($EPC > 1$). Whereas, the maize that is use for import substitution and

regional trade did not get protections on its output price, but have subsidy in farming inputs. The different case in this paper is when rice is an important food commodity that always get protection from government although it is not an export commodity or import substitution. Associated with the aspect on commodity protection policy, Hadi and Nuryanti (2005) found out that the protection strategy is the strategy that was pursued by the Indonesian government to protect the sugar industry in Indonesia. The government use two policy instruments: (1) Imposition of ad-valorem tariff rate of 20% for raw sugar and 35% for white sugar (2000 to 2001), then since 2002, it has been converted into specific tariff of IDR 550/kg for raw sugar and IDR 700/kg for white sugar; (2) non-tariff policies such as regulation, supervision and restriction on sugar importation which have an impact rise for domestic prices.

Associated with the results of this paper, it can be argued that the EPC value indicates a protection policy on output and input of rice farming. This means that domestic price are above pursued efficiency price (world price), so hopefully this can inhibit the activities of illegal exportation. The protection policy on output and input has increased the farmers' surplus (NT value). While based on PC and SRP values, overall government policy on rice farming is generally profitable to the farmers (producers) and leads to the production cost can be reduced.

Ilham and Rusastra (2009) found out that in the period of 1986 to 2001 there was a decline in the competitiveness of paddy (rice). It was responded by government with protection policy on output, in a way that the commodity is totally protected by the government ($EPC > 1.0$). It is relevant to the result in this paper, where there has been a decline in comparative advantage of rice in Bolaang Mongondow District. In 1999, DRC value is 0.61, while in 2009, DRC value is 0.68. So, it seems reasonable that if the government do the protection on this commodity.

CONCLUSION

Generally, rice farming in Bolaang Mongondow is feasible both financially and economically, indicated by the private profitability ($D > 1$) and social profitability ($H > 1$) and also 0 have the RC-ratio greater than one. Rice farming in Bolaang Mongondow has competitive and comparative advantages and is still able to finance domestic inputs. The local government policies on rice farming (such as input-output protection and price policy) was giving more benefits to the farmers and to the competitiveness of this commodity at Bolaang Mongondow district (local specific).

Conflict of Interests

The author(s) have not declared any conflict of interests.

REFERENCES

- Anapu H, Ruaw E, Talumingan C, Lobo A, dan Pangemanan L (2005). Dampak Kebijakan Tarif Impor Beras di Kabupaten Minahasa, Sulawesi Utara. Dalam Buku Aplikasi *Policy Analysis Matrix* pada Pertanian di Indonesia. Yayasan Obor Indonesia, Jakarta.
- Darwis V, dan Nurmanaf AR (2004). Kebijakan Distribusi, Tingkat Harga dan Penggunaan Pupuk di Tingkat Petani. *Jurnal Forum Penelitian Agro Ekonomi*, 22(1):63-73.
- Hadi PU, dan Nuryanti S (2005). Dampak Kebijakan Proteksi Terhadap Ekonomi Gula Indonesia. *Jurnal Agro Ekonomi*, 23(1):82-99.
- Hadi PU, dan Wiryono B (2005). Dampak Kebijakan Proteksi Terhadap Ekonomi Beras di Indonesia. *Jurnal Agro Ekonomi* 23(2):159-175.
- Ilham N, Rusastra IW (2009). Daya Saing Komoditas Pertanian: Konsep, Kinerja dan Kebijakan Pengembangan. *Jurnal Pengembangan Inovasi Pertanian*, 3(1):38-51.
- Monke EA, Pearson SK (1989). *The Policy Analysis Matrix For Agricultural Development*. Cornell University Press, Ithaca.
- Nuryanti S (2005). Analisa Keseimbangan Sistem Penawaran dan Permintaan Beras di Indonesia. *Jurnal Agro Ekonomi*, 23(1):71-81.
- Pearson S, Gotsch C, Bahri S (2005). *Aplikasi Policy Analysis Matrix pada Pertanian Indonesia*. Terjemahan. Yayasan Obor Indonesia, Jakarta.
- Rachman B, Simatupang P, Sudaryanto T (2004). Efisiensi dan Daya saing Sistem Usahatani Padi. *Prosiding Efisiensi dan Daya saing Sistem Usahatani Beberapa Komoditas Pertanian di Lahan Sawah*. Pusat Penelitian Sosial Ekonomi dan Kebijakan Pertanian, Bogor.
- Sawit MH, dan Halid H (2010). *Arsitektur Kebijakan Beras di Era Baru*. IPB-Press, Bogor.
- Sawit MH, Lokollo EM (2007). Rice Import Surge in Indonesia. *The Indonesian Center for Agriculture Socio-Economic and Policy Studies (ICASEPS)*, Bogor.
- Suprpto (2006). Keunggulan Komparatif dan Dampak Kebijakan Produksi Jagung di Propinsi Jawa Timur. *Buletin Penelitian Puslit Universitas Mercubuana* (10):89-106.
- Suryana A (1980). Keuntungan Komparatif dalam Produksi Ubikayu and Jagung di Jawa Timur and Lampung dengan Analisa Penghematan Biaya Sumberdaya Domestik (BSD). Tesis Magister Sains. Sekolah Pascasarjana, Institut Pertanian Bogor, Bogor.
- Tsakok I (1990). *Agricultural Price Policy: A Practitioner's Guide to Partial Equilibrium Analysis*. Cornell University Press, Ithaca.
- Yao S (1997). Rice Production in Thailand seen through a Policy Analysis Matrix. *Food Policy J*. 22(6):547-560.
- Zulkiffi M, dan Aryanto B (2000). Analisis daya saing usahatani jagung di kabupaten Bolaang mongondow propinsi sulawesi utara.